Carbon Capture and Sequestration using Microalgae

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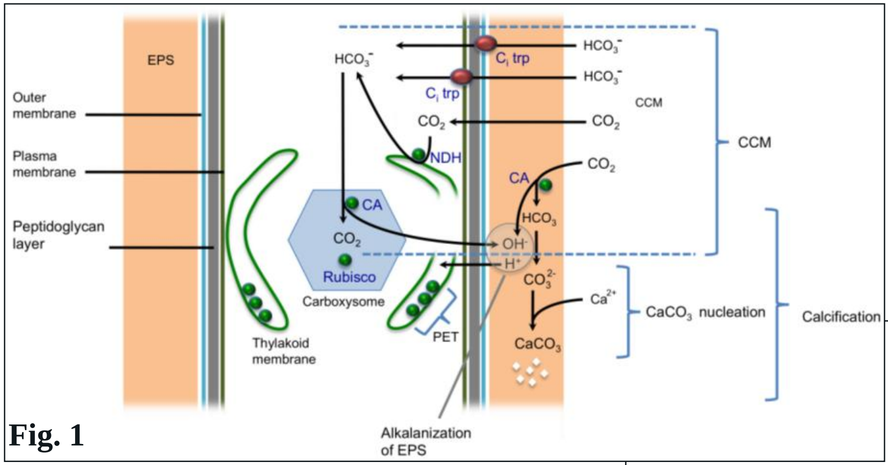
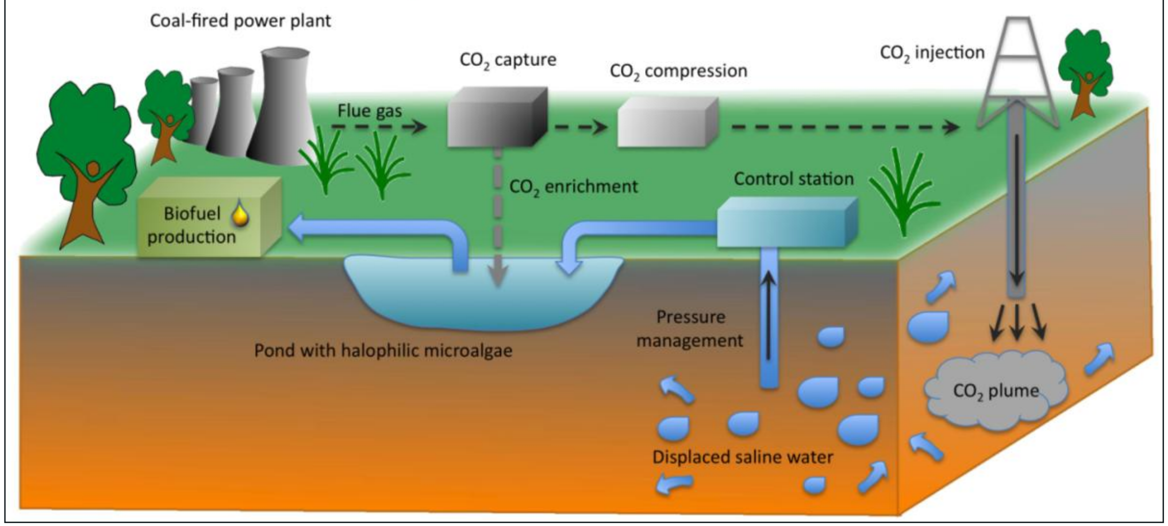


Fig. 1

Many cyanobacteria and eukaryotic microalgae have the ability to utilize very high CO_2 concentrations, in some cases well above 50% CO_2 [1-3]. The biochemical explanation for why microalgae both tolerate and flourish in such CO_2 levels is found within their carbon-concentrating mechanism (CCM), a metabolic system that allows the cells to enrich the amount of CO_2 at the site of Rubisco up to 1000-fold over that in the surrounding medium (Fig. 1) [4, 5].

Fig. 2. Pictorial representation [15] of microalgal biofuel production linked to carbon capture from local fossil fuel-fired power plant and utilization of brine from CCS operation.



Conclusions from experiments [6-14] are that:

(1) microalgae can assimilate CO_2 from sources such as flue gas;
(2) many species are unaffected by the NO_x and SO_x present in flue gas;
(3) thermophiles can be employed so as to minimize the cost of cooling the flue gas
(4) nutrients can be supplied via municipal wastewater to reduce operation costs
(5) both freshwater and marine species can be used.

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